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1 A high-power semiconductor device, comprising:

a substrate having a cavity extending from at least one surface of the substrate,

a cathode having an electron-emitting coating disposed thereon, wherein the cathode is suspended near the opening of the cavity in the substrate, wherein the electron emitting coating is made of a low work function material;

an anode constructed of an electrically conductive material, wherein the anode is configured to receive electrons emitted by the cathode, and wherein the anode is configured to produce an electrical current from the received electrons, wherein the anode is configured to communicate the electrical current to an external circuit;

a grid forming at least one aperture configured for allowing the passage of electrons therethrough, wherein the grid is constructed of an electrically conductive material, and wherein the grid is positioned between the cathode and anode;

a seal for creating a controlled environment in an area surrounding the anode, cathode, and grid; and

a circuit configured for heating the cathode.

Alternative Amendment to Claim 1, which has a more defined definition of a low work function material.

1. A high-power semiconductor device, comprising:

a substrate having a cavity extending from at least one surface of the substrate;

a cathode having an electron-emitting coating disposed thereon, wherein the cathode is suspended near the opening of the cavity in the substrate, wherein the grid is made of material selected from the group consisting of BaSrCa tricarbonates, BaSr, BaSrAl, thoriated tungsten, scandia, scandate and cesium;

an anode constructed of an electrically conductive material, wherein the anode is configured to receive electrons emitted by the cathode, and wherein the anode is configured to produce an electrical current from the received electrons, wherein the anode is configured to communicate the electrical current to an external circuit;

a grid forming at least one aperture configured for allowing the passage of electrons therethrough, wherein the grid is constructed of an electrically conductive material, and wherein the grid is positioned between the cathode and anode;

a seal for creating a controlled environment in an area surrounding the anode, cathode, and grid; and

a circuit configured for heating the cathode.

Applicant also notes that the structure of the device, having a cavity (160) etched into the substrate, i.e., "a cavity extending from at least one surface of the substrate," provides for improved heat dissipation of the cathode (113). See figure 1 attached. This structure of a cavity directly etched directly into a substrate is not disclosed or suggested in the cited references.